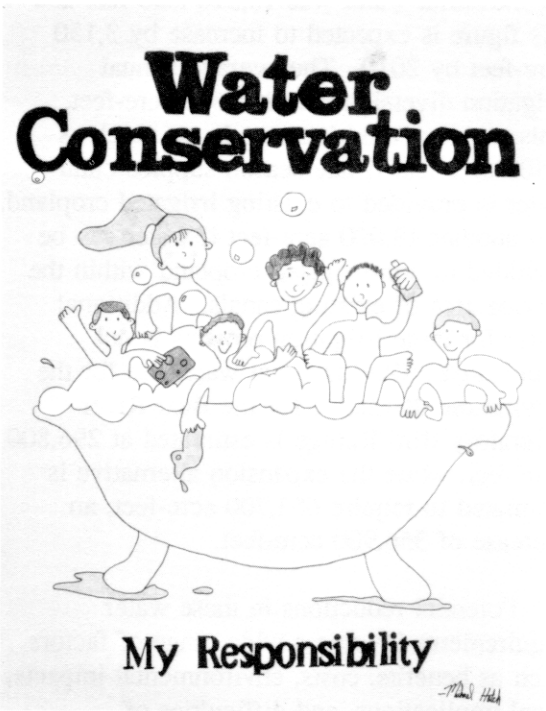
Section 17 ■ CONTENTS

Section 17
WATER CONSERVATION

This section discusses water conservation needs, issues, and potential alternatives, and gives some recommendations for conserving water use.

17.1 INTRODUCTION

In the State Water Plan, water conservation is defined as "wise use," which is much wider in scope than merely reducing water consumption. To guide the management of its three revolving fund programs for water development projects, the Board of Water Resources has issued a policy statement on water conservation. The policy supports conservation and the wise use of water. It states that conservation will be examined as an alternative and a supplement to project proposals. Sponsors for projects are encouraged to prepare an effective conservation plan.



Michael Hatch - Grand Prize Winner, 1988
Young Artists Water Education Poster Contest

Significant water use reductions can be (and have been) achieved when people understand the reasons to conserve, especially in times of drought. It must be remembered, though, that reducing demand for water is unimportant if cost savings are not realized or the water cannot be stored and/or used for other desirable purposes.

Water conservation can be pursued through two strategies: (1) reducing the demand by using the existing supply more efficiently, and (2) increasing the supply by operating the storage and delivery facilities more efficiently (including the elimination of conveyance losses). Examples of (1) are restricted outside use, changes in landscaping, new and efficient plumbing, pricing, and water education. Examples of (2) are dual systems, re-use, water right transfers, and conjunctive use. Both of these strategies are valid in the Bear River Basin. Structural and non-structural measures apply to each. While opportunities exist to do much more in the basin, significant achievements in the wise use of water have been made. Storage reservoirs have been built,

open delivery facilities have been lined or replaced with pipelines, and irrigation application efficiencies are being improved.

17.2 SETTING

The 1990 average annual diversion for municipal water in the Bear River Basin in Utah was 51,170 acre-feet. This amount is expected to increase by 14,390 acre-feet by the year 2010. The 1990 average annual diversion for industrial water was 10,310 acre-feet and this figure is expected to increase by 3,150 acre-feet by 2010. The average annual irrigation diversion was 885,600 acre-feet. This amount could increase by as much as 9,500 acre-feet if late season supplemental water is provided to existing irrigated cropland, and another 18,000 acre-feet if water can be provided to non-irrigated cropland within the service area of existing canals. Additional water for large irrigation projects is not anticipated. The historical water use for the restoration alternative for the Bear River Migratory Bird Refuge is estimated at 296,800 acre-feet, while the expansion alternative is estimated to require 653,700 acre-feet, an increase of 356,900 acre-feet.

Potential reductions in these water requirements involve a wide range of factors such as benefits, costs, environmental impacts, legal implications, and difficulties of implementation. For example, enhancement or expansion of the Bear River Migratory Bird Refuge requires more water, most of which would have to come from reservoir storage, and would most likely be in competition with other uses. Industrial water uses are so varied that it is difficult to make generalizations about conservation, except that the amount of total use (as well as any potential saving) is small. Potential conservation of municipal and irrigation water is discussed separately before considering specific methods and strategies.

17.3 NEEDS, ISSUES, AND ALTERNATIVES

The need for water conservation in the Bear River Basin is relative to all of the factors mentioned previously, as well as to geography and water quality. In terms of total foreseeable uses, it will be a long time before a limited water supply will necessitate a massive water conservation effort. But totals alone do not convey an accurate picture. Although water supplies in the basin are generally plentiful, shortages already occur in some areas, especially during droughts. Because of differing local circumstance, each area and the uses within that area must be considered separately. Also, in most cases, economics and water quality are the overriding factors. If this were not so, coastal states like California would have available to them the world's largest water supply: the Pacific Ocean.

17.3.1 Municipal Water Conservation

Conservation of municipal water appears to be an appropriate and feasible way of meeting part of the basin's future water requirements. Actual implementation, however, is somewhat complicated.

As discussed in Section 11, the 14,390 acre-feet per year of new water requirement to the year 2010 will most likely be met by a combination of actions. The alternative actions are water conservation, new wells, new reservoirs, and inter-county transfers. Each of the 52 community water systems has a different set of problems and circumstances, so the best means for meeting needs may not be the same for all.

The following figures show that if water conservation were to compensate for new developments, the overall per capita use must drop to 0.363 acre-feet per year.

Year	Population	Total Use (acre-feet/year)	Per Capita Use (acre-feet/year)
1990	108,393	51,170	.472
2010	140,800	51,170	.363

This per capita use rate is not unreasonable in relation to the statewide average of 0.318, but several difficulties are encountered. One is that the communities most in need of water are already practicing conservation and have low rates of per capita use. Communities with higher per capita use rates have plenty of water and little incentive to conserve. Communities with little or no reserve capacity are also hurt most by drought years (See Tables 11-8 through 11-10), while those with adequate surplus are almost unaffected by drought. If those communities with a high per capita use and large reserve capacity were to lower their use of water by practicing conservation, it would not help the communities presently in short supply. Very few pipelines connect communities. For example, reduction of use in Brigham City would not help Tremonton. Nevertheless, such sharing of supplies would be beneficial whenever possible, and is a wise use of water. This is occurring in Salt Lake County, where the Metropolitan Water District currently is sharing its surplus with the Salt Lake County Water Conservancy District.

Table 17-1 shows per capita use rates for public water systems. Water use rates are higher in the Bear River Basin than the state average, probably because of a large use by dairies and other commercial and industrial uses.

17.3.2 Irrigation Conservation

Of the 885,600 acre-feet of water per year diverted for irrigation, about 402,000 is consumed by crops (535,600, minus about 134,000 supplied by rainfall on irrigated land). Without reducing the irrigated area or supplying less water than the crops need, the 402,000 acre-feet is a minimum that probably couldn't be reduced further. The other 484,000 acre-feet either runs off the fields or seeps into the ground where most of it returns to the river downstream. Essentially, the only portion lost is evapotranspiration in riparian areas adjacent to the river and irrigated lands throughout the basin. In Rich County, these return flows enter the river and are stored in Bear Lake. In Cache County, they flow into Cutler Reservoir, and in Box Elder County they are diverted to the federal bird refuge or flow into the Great Salt Lake.

Irrigation diversions can be reduced by eliminating conveyance losses, such as canal seepage, and improving irrigation scheduling during each day of the growing season. Repairing canals and linings is a constant activity of irrigation companies. Sprinkler irrigation is one way to improve the scheduling process by applying the optimum amount of water on each crop at the optimum time. About one-third of the irrigated land in the basin is served by sprinklers, and conversion to this method is continuing. Although diversion requirements are usually reduced by sprinkler irrigation, consumptive use is often greater because of the larger, healthier plants associated with better crop yields. Some excess irrigation water beyond the actual consumptive use is necessary to prevent accumulation of harmful salts on the soil surface with evaporation.

TABLE 17-1
DRINKING WATER USE

County	1990 Per Capita Use[a] (gallons/ day)	(acre-feet/year)
Rich	501	.561
Cache	406	.455
Box Elder	389	.436
Basin Average	421	.472
State Average	284[b]	.318

[a]From Table 11-7
[b]For 1989

In view of these circumstances, substantial savings from conservation of irrigation water are not likely.

17.3.3 Conservation Methods and Strategies

A wide range of water conservation methods have been used in other areas and other states. The experience gained by using these methods can be helpful to others, although circumstances are always different. Their application in the Bear River Basin is discussed in the following paragraphs.

Public Information/Education - Because everyone is a water user, any significant gain in water conservation is an accumulation of individual attitudes and efforts. Therefore, public education is essential in conserving water. The degree of success will be in direct ratio to the public perception of conservation's need or importance. Every public agency or private organization concerned with planning, developing, or distributing water has a responsibility in this regard. Two examples of water conservation material currently being distributed to schools, water-user organizations, individuals (on request) in the Bear River Basin, and throughout the state, are shown on Figures 17-1 and 17-2. This material is part of a water education program by the Division of Water Resources. Other conservation objectives of the division's education program include water-efficient landscaping and gardening techniques ("Xeriscape"), conversion to more efficient hardware such as low-flush toilets, and a continuing communication with students in the elementary schools.

Institutionalizing water conservation - Effective water conservation requires cooperative effort by all segments of the public, especially individuals. The desired unity of effort can best be achieved through the organized leadership of public agencies and other social or political groups. Organized institutional conservation efforts are starting to occur in some areas of Utah, but apparently not in the Bear River Basin.

Restricting Water Use - To make enough water available for necessary household (and commercial) use during periods of severe drought like in 1977, the use of municipal water for lawn and garden watering and other outside uses has often been restricted. This has usually been referred to as "water rationing." One of the easiest restrictions to monitor and enforce is to prohibit outside use on certain days of the week, or to allow outside use on

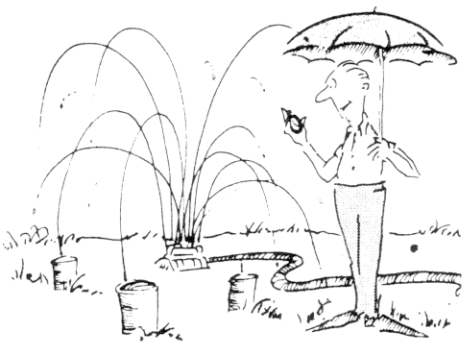
FIGURE 17-1

Lawn Watering Guide

Lawn watering uses nearly half of the water around homes. Most of us tend to water too often and leave the sprinklers on too long.

Turf studies have shown that most lawns only need to be watered once every 3 or 4 days to stay healthy and green. Watering every day creates shallow roots. Watering infrequently develops deep roots and healthier turf. Grass roots grow deeper into the soil and become stronger with less watering. If grass does not spring back after being stepped on, it's time to water. Water only when needed.

Use the watering schedule as a guide. Your lawn may need more water when it's extra hot or less when it's cool. Water less when it rains. Avoid watering on windy days or midday when the evaporation level is the highest. Try to water during the early morning hours. Proper lawn watering can save a lot of water — and that saves you money. For more information on water conservation call (801) 538-7299.



Utah Division of Water Resources
1636 West, North Temple
Salt Lake City, Utah 84116

Determine your lawn watering needs.

1. Set 3 or more flat bottom cans or coffee mugs at various places on your lawn at least 4 feet from sprinkler head.
2. Turn on your sprinkler(s) for 15 minutes.
3. Measure the depth of water in each can with a ruler and determine the average water depth in the cans.
4. Match your sprinkler output with table below. Then water the number of minutes indicated.

Water Depth in Cans		1/8	3/16	1/4	5/16	3/8	1/2	5/8	3/4	1
SEASON		Watering Time In Minutes								
	Spring (Water every 4 days)	52	34	26	20	17	13	10	9	6
	Summer (Water every 3 days)	69	69	52	41	35	26	21	17	13
	Fall (Water every 3 days)	104	51	39	31	26	19	15	13	10

*Water through October 15 and again November 1st for Winter.
Note: If water begins to run off; stop and let it soak in a few minutes, then continue for the recommended time.
St. George / Dixie area - Add 10 minutes to watering times above.

FIGURE 17-2

PLEASE CONSERVE WATER!

Compliments of:

Utah Division of Water Resources
1636 W.N. Temple
Salt Lake City, Utah 84116
For more information call **(801) 538-7200**

WATER CONSERVATION REMINDERS:

1. FIX LEAKS: A dripping faucet can add up to a loss of 15 to 20 gallons per day. Faucet leaks are commonly caused by a worn washer. The few cents it takes to replace the washer is well worth the saving in precious water. A leaky toilet can waste up to 100 gallons a day. To detect one kind of toilet leak, drop some food coloring in the tank and wait about 15 minutes, without flushing. If the color has entered the bowl, there's a leak that should be fixed.
2. TOILETS: Toilets use about 40% of all water used in homes. Don't use the toilet to dispose of things that belong in the wastebasket. Most toilets use 5½ gallons per flush. You can reduce the amount of water used by weighting on empty plastic laundry or soap bottle with clean stones, fill with water, and place in the toilet tank, out of the way of the moving parts.
3. PERSONAL CLEANLINESS: Bathing and showering account for 30% of household water use. Short showers can consume less water than baths. Running the water while brushing your teeth or shaving can waste 10 gallons!
4. LAUNDRY AND DISHES: Dish and clothes washers account for 20% of home water consumption. Be sure to wash full loads only. When washing dishes by hand, use a sink stopper or dishpans full of suds and rinse water, not running water.
5. DRINKING WATER: Rather than running water until cool, keep a bottle of tap water in the refrigerator.

**By accepting this device, the consumer assumes all liability arising out of its installation and use

the left or right side of the street, alternately. In the most severe cases, all outside use has been temporarily prohibited.

Corresponding restrictions on irrigators have also been imposed, but more frequently than on munimcipal users. The most common restriction is in accordance with water right priorities (first in time, first in right). Sometimes users receive a partial supply for each share of stock they own in an irrigation company.

The public has accepted these restrictions willingly, because they understand the necessity and realize the situation is temporary. But it is doubtful if the public would accept restrictions if they are perceived to be unnecessary, or are artificially contrived.

Joint Use of Water Supplies - Joint use (often called "conjunctive use") most often refers to surface water and groundwater. Where both are available as a water supply, groundwater can be allowed to accumulate during wet years, and then pumped in dry years to supplement surface water supplies. This is an excellent example of wise use, because it maximizes the available water supply.

Similarly, treated and untreated water can be used jointly to conserve high quality water for M&I use, as well as reduce costs. An auxiliary ("secondary," or "dual") water system to distribute untreated water for lawn and garden use allows a smaller system capacity of expensive, treated M&I water to suffice. A substantial portion of high-quality treated water in public water systems in the basin is customarily used for lawn and garden watering (See Section 11.4).

Several communities now have dual water systems for outside use. Among them are Paradise, Newton, Richmond, Smithfield, and Hyrum. Dual systems in a few other communities are under consideration. As high quality M&I water becomes more limited and expensive to treat, an increasing number of dual systems can be expected.

Landscaping and Home Water Savings - Reductions in per capita use of municipal water requires changes in personal habits and traditional practices inside and outside the home. This requires a mixed effort and a public perception of need. But a mixed effort can produce significant savings.

Inside, users can install water-saving toilets and shower heads, check plumbing for leaks, take shorter showers, use automatic dishwashers and washing machines only for full loads, and avoid having faucets run long periods for rinsing vegetables, dishes, and other items. Outside, users can avoid using a hose to clean driveways, letting water run to waste while washing a car, and improve landscaping practices. The Division of Water Resources teaches and encourages water conservation through creative landscaping (or "Xeriscaping"). The principles include limiting lawn areas, using plants and trees with low water requirements, irrigating only when needed, watering during morning or evening hours, and improving soils in shrub and garden areas by using mulches.

Pricing - Pricing policies are sometimes suggested as a means of reducing per capita water use. The change in per capita use in the Bear River Basin that would result from increasing water prices is unknown. The impact on the amount of water used would vary for each community water system. The rate increase would have to be substantial to be effective, according to general consensus. Such action, however, would require strong public support. For comparative purposes, rate schedules for several communities in the basin and in other Utah communities are shown in Table 17-2.

Reuse - No direct reuse or recycling of wastewater for drinking water use has been

accepted in the United States, except in emergency situations. However, reuse of wastewater for industrial, agricultural, and other uses such as golf course watering is becoming more common.

In the Bear River Basin, some direct reuse is already taking place. Approximately 1,400 acres of pasture and alfalfa are irrigated with water from the Logan City wastewater lagoon. The total use is approximately 4,100 acre-feet per year.

TABLE 17-2
RESIDENTIAL WATER RATES, 1985-86[4]

City	1990 Population	Monthly Base Rate	Minimum (gal.)	Rate (Per 1,000 gal.)	Cost for 30,000 gal.
Brigham City	15,644	$3.18	7,000	$0.254	$ 9.02
Tremonton	4,264	13.00[a]	15,000[a]	.60[a]	22.00
Garland	1,637	8.50	20,000	.50	13.50
Perry	1,211	9.50	15,000	.75	20.75
Corinne	639	8.40	12,000	.50	17.40
Plymouth	267	12.00	Unlimited	None	12.00
Logan	32,762	7.75[b]	3,000[b]	.45[b]	19.90
Hyrum	4,829	7.00	10,000	.25	12.00
N. Logan	3,768	5.25	1,000	1.00	34.25
Providence	3,344	7.00[e]	10,000[e]	.25[e]	12.00
Wellsville	2,206	7.50	35,000	.25	7.50
Richmond	1,955	9.40	10,000	.14	12.20
Nibley	1,167	9.00	15,000	.15	11.25
Newton	659	6.00	20,000	.08	6.80
Clarkston	645	12.91[d]	Unlimited	None	12.91
Trenton	464	17.85	700	.15	22.24
Randolph	488	10.00	15,000	.75	21.25
Woodruff	135	10.00	15,000	1.00	25.00
Laketown	261	8.00[f]	12,000[f]	.75[f]	21.50
Sandy	75,058	8.52	6,000[c]	.52	21.00
Bountiful	36,659	5.00	5,000	.73	17.38
Cedar City	13,443	14.00	10,000	.40	22.00
Vernal	6,644	4.20	8,000	1.10	28.40
Richfield	5,593	3.15	3,000	.25	8.90
Beaver	1,998	10.00	1,000	.30	18.70

[a]From city officials, 6-90.
[b]From Deseret News, 8-17-91.
[c]Minimum is 12,000 gal. in 60 days.
[d]Average fee.
[e]From Board of Water Resources Meeting, 12-21-90.
[f]From Board of Water Resources Meeting, 6-21-91.

Water Measurement - Accurate measurement of water encourages water conservation in several ways. Not only is each user assured of fair and equitable distribution and financial assessments, but it is also a more businesslike way to operate a system and provide records. Where users pay according to the quantity of water they actually use, there is a built-in tendency to conserve, whether the use is irrigation, municipal, or industrial. Most community water systems in the basin are metered. It may be practical, however, to meter all water systems.

17.4 RECOMMENDATIONS

The following recommendations relate directly to the discussions on various conservation methods described in Section 17.3.

17.4.1 Municipal Water Conservation

Each community should evaluate its own particular situation with regard to present supplies, present per capita use, anticipated future growth, and availability of new supplies. Then, a written water conservation plan should be prepared that will provide a good, long-term water supply at the optimum cost. For communities already in need, the plan should be designed to stretch their present supply until additional supplies are available. Until then, water use restrictions may be necessary. The new supply should allow a sufficient reserve capacity to manage in future drought periods. For communities with a current surplus, the plan should recognize this fortunate circumstance. In an orderly, unhurried way, they can implement conservation practices to accommodate anticipated future growth with the present surplus, and thus delay the expense of enlarging the present supply. The plan should also recognize the importance of maintaining an adequate reserve capacity.

17.4.2 Irrigation Conservation

Irrigation companies should also prepare a water conservation plan, after reviewing their own water supply situation. The plan should be designed to better the farmers and the company economically. To the extent allowable under current regulations for adjacent wet areas, canals should continue to be lined and maintained to reduce seepage losses. Conversion to sprinkler irrigation should be encouraged and supported whenever it is economically feasible. Further improvement of irrigation scheduling toward a goal of optimum water application at optimum times should be attempted.

17.4.3 Conservation Methods and Strategies

The methods and strategies in Section 17.3.3 with the most universal application in the Bear River Basin and recommended as being most likely to produce significant results are:

- public information/education
- landscaping and house water savings

Reasons for this recommendation are part of the description and discussion. Although less universal, the other methods can be very effective in particular communities with special conditions. Joint use of supplies should always be attempted whenever it is appropriate.

17.5 REFERENCES

In addition to the references listed below, Section 17 of the Utah State Water Plan, January 1990, discusses statewide water conservation related uses in more detail.

1. "Wasatch Front Total Water Management Study," Bureau of Reclamation and Utah Division of Water Resources, Joint Final Report, February 1990.